

## SEQUENCE LISTING

<110> Mello, Craig C.  
Tabara, Hiroaki  
Grishok, Alla  
Fire, Andrew

<120> RNA INTERFERENCE PATHWAY GENES AS TOOLS FOR TARGETED GENETIC INTERFERENCE

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<140> US 09/689,992

<141> 2000-10-13

<150> US 60/193,218

<151> 2000-03-30

<150> US 60/159,776

<151> 1999-10-15

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Glu	Val	His	Glu	Lys	Pro	Gln	Arg	Tyr	Lys	Asn	Arg	Ile	Asp	Leu	Val	420	425	430
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Lys	Glu	Asn	Thr	Leu	Lys	Met	Leu	Lys	Glu	Leu	Asp	Phe	Ser	Ser	Glu	450	455	460
Glu	Leu	Asn	Phe	Val	Glu	Arg	Phe	Gly	Leu	Cys	Ser	Lys	Leu	Gln	Met	465	470	475
Ile	Glu	Cys	Pro	Gly	Lys	Val	Leu	Lys	Glu	Pro	Met	Leu	Val	Asn	Ser	485	490	495
Val	Asn	Glu	Gln	Ile	Lys	Met	Thr	Pro	Val	Ile	Arg	Gly	Phe	Gln	Glu	500	505	510
Lys	Gln	Leu	Asn	Val	Val	Pro	Glu	Lys	Glu	Leu	Cys	Cys	Ala	Val	Phe	515	520	525
Val	Val	Asn	Glu	Thr	Ala	Gly	Asn	Pro	Cys	Leu	Glu	Glu	Asn	Asp	Val	530	535	540
Val	Lys	Phe	Tyr	Thr	Glu	Leu	Ile	Gly	Gly	Cys	Lys	Phe	Arg	Gly	Ile	545	550	555
Arg	Ile	Gly	Ala	Asn	Glu	Asn	Arg	Gly	Ala	Gln	Ser	Ile	Met	Tyr	Asp	565	570	575
Ala	Thr	Lys	Asn	Glu	Tyr	Ala	Phe	Tyr	Lys	Asn	Cys	Thr	Leu	Asn	Thr	580	585	590
Gly	Ile	Gly	Arg	Phe	Glu	Ile	Ala	Ala	Thr	Glu	Ala	Lys	Asn	Met	Phe	595	600	605
Glu	Arg	Leu	Pro	Asp	Lys	Glu	Gln	Lys	Val	Leu	Met	Phe	Ile	Ile	Ile	610	615	620
Ser	Lys	Arg	Gln	Leu	Asn	Ala	Tyr	Gly	Phe	Val	Lys	His	Tyr	Cys	Asp	625	630	635
His	Thr	Ile	Gly	Val	Ala	Asn	Gln	His	Ile	Thr	Ser	Glu	Thr	Val	Thr	645	650	655
Lys	Ala	Leu	Ala	Ser	Leu	Arg	His	Glu	Lys	Gly	Ser	Lys	Arg	Ile	Phe	660	665	670
Tyr	Gln	Ile	Ala	Leu	Lys	Ile	Asn	Ala	Lys	Leu	Gly	Gly	Ile	Asn	Gln	675	680	685
Glu	Leu	Asp	Trp	Ser	Glu	Ile	Ala	Glu	Ile	Ser	Pro	Glu	Glu	Lys	Glu	690	695	700
Arg	Arg	Lys	Thr	Met	Pro	Leu	Thr	Met	Tyr	Val	Gly	Ile	Asp	Val	Thr	705	710	715
His	Pro	Thr	Ser	Tyr	Ser	Gly	Ile	Asp	Tyr	Ser	Ile	Ala	Ala	Val	Val	725	730	735
Ala	Ser	Ile	Asn	Pro	Gly	Gly	Thr	Ile	Tyr	Arg	Asn	Met	Ile	Val	Thr	740	745	750
Gln	Glu	Glu	Cys	Arg	Pro	Gly	Glu	Arg	Ala	Val	Ala	His	Gly	Arg	Glu	755	760	765
Arg	Thr	Asp	Ile	Leu	Glu	Ala	Lys	Phe	Val	Lys	Leu	Leu	Arg	Glu	Phe	770	775	780
Ala	Glu	Asn	Asn	Asp	Asn	Arg	Ala	Pro	Ala	His	Ile	Val	Val	Tyr	Arg	785	790	795
Asp	Gly	Val	Ser	Asp	Ser	Glu	Met	Leu	Arg	Val	Ser	His	Asp	Glu	Leu	805	810	815
Arg	Ser	Leu	Lys	Ser	Glu	Val	Lys	Gln	Phe	Met	Ser	Glu	Arg	Asp	Gly	820	825	830
Glu	Asp	Pro	Glu	Pro	Lys	Tyr	Thr	Phe	Ile	Val	Ile	Gln	Lys	Arg	His	835	840	845



Asn Thr Arg Leu Leu Arg Arg Met Glu Lys Asp Lys Pro Val Val Asn  
 850 855 860  
 Lys Asp Leu Thr Pro Ala Glu Thr Asp Val Ala Val Ala Val Lys  
 865 870 875 880  
 Gln Trp Glu Glu Asp Met Lys Glu Ser Lys Glu Thr Gly Ile Val Asn  
 885 890 895  
 Pro Ser Ser Gly Thr Thr Val Asp Lys Leu Ile Val Ser Lys Tyr Lys  
 900 905 910  
 Phe Asp Phe Phe Leu Ala Ser His His Gly Val Leu Gly Thr Ser Arg  
 915 920 925  
 Pro Gly His Tyr Thr Val Met Tyr Asp Asp Lys Gly Met Ser Gln Asp  
 930 935 940  
 Glu Val Tyr Lys Met Thr Tyr Gly Leu Ala Phe Leu Ser Ala Arg Cys  
 945 950 955 960  
 Arg Lys Pro Ile Ser Leu Pro Val Pro Val His Tyr Ala His Leu Ser  
 965 970 975  
 Cys Glu Lys Ala Lys Glu Leu Tyr Arg Thr Tyr Lys Glu His Tyr Ile  
 980 985 990  
 Gly Asp Tyr Ala Gln Pro Arg Thr Arg His Glu Met Glu His Phe Leu  
 995 1000 1005  
 Gln Thr Asn Val Lys Tyr Pro Gly Met Ser Phe Ala  
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&lt;210&gt; 4

&lt;211&gt; 1222

&lt;212&gt; DNA

&lt;213&gt; Caenorhabditis elegans

&lt;400&gt; 4

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ccttcccgat	cggaggataa	caaaacgcc	agaaacagaa	cagatttgga	gatgtttctg	120
aagaaaactc	ccctcatggt	actagaagag	gctgctaagg	ctgtctatca	aaagacgcc	180
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gaagaagctc	tttcgaatat	tgatcaaata	tcggataagg	ctgaggaatt	gaaacgatca	420
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gttatatgca	cgatgtgcaa	tcaaaaaacc	agaggaatca	gaagtaagaa	gaaggacgca	660
aagaatcttg	cagcatggtt	gatgtggaaa	gcgttggaag	acggtatcga	atctctggaa	720
tcatatgata	tggttgatgt	gattgaaaat	ttggaagaag	ctgaacattt	actcgaaatt	780
caggatcaag	catccaagat	taaagacaag	cattccgcac	tgattgatat	actctcggac	840
aagaaaagat	tttcagacta	cagcatggat	ttcaacgtat	tatcagtgag	cacaatggga	900
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tcacgcgcgg	aagaggctaa	acagtgtgct	tgtaaatcgg	cgattatcca	tttcaacacc	1140
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&lt;210&gt; 5

&lt;211&gt; 407

&lt;212&gt; PRT

&lt;213&gt; Caenorhabditis elegans

&lt;400&gt; 5

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Lys Phe Val Ala Arg Ala Asn Met His His Leu Gly Glu Phe Leu Ala  
20 25 30  
Gly Lys Arg Ala Asp Cys Pro Gln Glu Ala Val Gln Ile Leu Asp Ile  
35 40 45

Val	Leu	Arg	Glu	Leu	Ser	Val	Lys	Arg	Phe	Cys	Pro	Val	Gly	Arg	Ser
50						55					60				
Phe	Phe	Ser	Pro	Asp	Ile	Lys	Thr	Pro	Gln	Arg	Leu	Gly	Glu	Gly	Leu
65					70					75					80
Glu	Ser	Trp	Cys	Gly	Phe	Tyr	Gln	Ser	Ile	Arg	Pro	Thr	Gln	Met	Gly
				85					90					95	
Leu	Ser	Leu	Asn	Ile	Asp	Met	Ala	Ser	Ala	Ala	Phe	Ile	Glu	Pro	Leu
			100					105					110		
Pro	Val	Ile	Glu	Phe	Val	Ala	Gln	Leu	Leu	Gly	Lys	Asp	Val	Leu	Ser
		115					120					125			
Lys	Pro	Leu	Ser	Asp	Ser	Asp	Arg	Val	Lys	Ile	Lys	Lys	Gly	Leu	Arg
	130					135					140				
Gly	Val	Lys	Val	Glu	Val	Thr	His	Arg	Ala	Asn	Val	Arg	Arg	Lys	Tyr
145					150					155					160
Arg	Val	Ala	Gly	Leu	Thr	Thr	Gln	Pro	Thr	Arg	Glu	Leu	Met	Phe	Pro
				165					170					175	
Val	Asp	Glu	Asn	Cys	Thr	Met	Lys	Ser	Val	Ile	Glu	Tyr	Phe	Gln	Glu
			180					185					190		
Met	Tyr	Gly	Phe	Thr	Ile	Gln	His	Thr	His	Leu	Pro	Cys	Leu	Gln	Val
		195				200					205				
Gly	Asn	Gln	Lys	Lys	Ala	Ser	Tyr	Leu	Pro	Met	Glu	Ala	Cys	Lys	Ile
	210						215				220				
Val	Glu	Gly	Gln	Arg	Tyr	Thr	Lys	Arg	Leu	Asn	Glu	Lys	Gln	Ile	Thr
225					230					235					240
Ala	Leu	Leu	Lys	Val	Thr	Cys	Gln	Arg	Ala	Glu	Gly	Gln	Arg	Asn	Asp
				245					250					255	
Ile	Leu	Arg	Thr	Val	Gln	His	Asn	Ala	Tyr	Asp	Gln	Asp	Pro	Tyr	Ala
			260					265					270		
Lys	Glu	Phe	Gly	Met	Asn	Ile	Ser	Glu	Lys	Leu	Ala	Ser	Val	Glu	Ala
		275					280					285			
Arg	Ile	Leu	Pro	Ala	Pro	Trp	Leu	Lys	Tyr	His	Glu	Asn	Gly	Lys	Glu
	290					295					300				
Lys	Asp	Cys	Leu	Pro	Gln	Val	Gly	Gln	Trp	Asn	Met	Met	Asn	Lys	Lys
305					310					315					320
Met	Ile	Asn	Gly	Met	Thr	Val	Ser	Arg	Trp	Ala	Cys	Val	Asn	Phe	Ser
				325					330					335	
Arg	Ser	Val	Gln	Glu	Asn	Val	Ala	Arg	Gly	Phe	Cys	Asn	Glu	Leu	Gly
			340					345					350		
Gln	Met	Cys	Glu	Val	Ser	Gly	Met	Glu	Phe	Asn	Pro	Glu	Pro	Val	Ile
		355					360					365			
Pro	Ile	Tyr	Ser	Ala	Arg	Pro	Asp	Gln	Val	Glu	Lys	Ala	Leu	Lys	His
	370					375					380				
Val	Tyr	His	Thr	Ser	Met	Asn	Lys	Thr	Lys	Gly	Lys	Glu	Leu	Glu	Leu
385					390					395					400
Leu	Leu	Ala	Ile	Leu	Pro	Asp	Asn	Asn	Gly	Ser	Leu	Tyr	Gly	Asp	Leu
				405					410					415	
Lys	Arg	Ile	Cys	Glu	Thr	Glu	Leu	Gly	Leu	Ile	Ser	Gln	Cys	Cys	Leu
			420					425					430		
Thr	Lys	His	Val	Phe	Lys	Ile	Ser	Lys	Gln	Tyr	Leu	Ala	Asp	Val	Ser
		435					440					445			
Leu	Lys	Ile	Asn	Val	Lys	Met	Gly	Gly	Arg	Asn	Thr	Val	Leu	Val	Asp
	450					455					460				
Ala	Ile	Ser	Cys	Arg	Ile	Pro	Leu	Val	Ser	Asp	Ile	Pro	Thr	Ile	Ile
465					470					475					480
Phe	Gly	Ala	Asp	Val	Thr	His	Pro	Glu	Asn	Gly	Glu	Glu	Ser	Ser	Pro
				485					490					495	
Ser	Ile	Ala	Ala	Val	Val	Ala	Ser	Gln	Asp	Trp	Pro	Glu	Val	Thr	Lys
			500					505					510		
Tyr	Ala	Gly	Leu	Val	Cys	Ala	Gln	Ala	His	Arg	Gln	Glu	Leu	Ile	Gln
		515					520					525			

Asp Leu Tyr Lys Thr Trp Gln Asp Pro Val Arg Gly Thr Val Ser Gly  
 530 535 540  
 Gly Met Ile Arg Asp Leu Leu Ile Ser Phe Arg Lys Ala Thr Gly Gln  
 545 550 555 560  
 Lys Pro Leu Arg Ile Phe Tyr Arg Asp Gly Val Ser Glu Gly Gln  
 565 570 575  
 Phe Tyr Gln Val Leu Leu Tyr Glu Leu Asp Ala Ile Arg Lys Ala Cys  
 580 585 590  
 Ala Ser Leu Glu Pro Asn Tyr Gln Pro Pro Val Thr Phe Ile Val Val  
 595 600 605  
 Gln Lys Arg His His Thr Arg Leu Phe Ala Asn Asn His Arg Asp Lys  
 610 615 620  
 Asn Ser Thr Asp Arg Ser Gly Asn Ile Leu Pro Gly Thr Val Val Asp  
 625 630 635 640  
 Thr Lys Ile Cys His Pro Thr Glu Phe Asp Phe Tyr Leu Cys Ser His  
 645 650 655  
 Ala Gly Ile Gln Gly Thr Ser Arg Pro Ala His Tyr His Val Leu Trp  
 660 665 670  
 Asp Glu Asn Asn Phe Thr Ala Asp Gly Ile Gln Ser Leu Thr Asn Asn  
 675 680 685  
 Leu Cys Tyr Thr Tyr Ala Arg Cys Thr Arg Ser Val Ser Ile Val Pro  
 690 695 700  
 Pro Ala Tyr Tyr Ala His Leu Ala Ala Phe Arg Ala Arg Phe Tyr Leu  
 705 710 715 720  
 Glu Pro Glu Ile Met Gln Asp Asn Gly Ser Pro Gly Lys Lys Asn Thr  
 725 730 735  
 Lys Thr Thr Thr Val Gly Asp Val Gly Val Lys Pro Leu Pro Ala Leu  
 740 745 750  
 Lys Glu Asn Val Lys Arg Val Met Phe Tyr Cys  
 755 760

&lt;210&gt; 7

&lt;211&gt; 678

&lt;212&gt; PRT

<213> *Drosophila melanogaster*

&lt;400&gt; 7

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 Gln Ser Thr Asp Ala Glu Gln Phe Gln Val Leu Asn Leu Ile Leu Arg  
 20 25 30  
 Arg Ala Met Glu Gly Leu Asp Leu Lys Leu Val Ser Arg Tyr Tyr Tyr  
 35 40 45  
 Asp Pro Gln Ala Lys Ile Asn Leu Glu Asn Phe Arg Met Gln Leu Trp  
 50 55 60  
 Pro Gly Tyr Gln Thr Ser Ile Arg Gln His Glu Asn Asp Ile Leu Leu  
 65 70 75 80  
 Cys Ser Glu Ile Cys His Lys Val Met Arg Thr Glu Thr Leu Tyr Asn  
 85 90 95  
 Ile Leu Ser Asp Ala Ile Arg Asp Ser Asp Asp Tyr Gln Ser Thr Phe  
 100 105 110  
 Lys Arg Ala Val Met Gly Met Val Ile Leu Thr Asp Tyr Asn Asn Lys  
 115 120 125  
 Thr Tyr Arg Ile Asp Asp Val Asp Phe Gln Ser Thr Pro Leu Cys Lys  
 130 135 140  
 Phe Lys Thr Asn Asp Gly Glu Ile Ser Tyr Val Asp Tyr Tyr Lys Lys  
 145 150 155 160  
 Arg Tyr Asn Ile Ile Ile Arg Asp Leu Lys Gln Pro Leu Val Met Ser  
 165 170 175  
 Arg Pro Thr Asp Lys Asn Ile Arg Gly Gly Asn Asp Gln Ala Ile Met  
 180 185 190

Ile	Ile	Pro	Glu	Leu	Ala	Arg	Ala	Thr	Gly	Met	Thr	Asp	Ala	Met	Arg		
		195					200					205					
Ala	Asp	Phe	Arg	Thr	Leu	Arg	Ala	Met	Ser	Glu	His	Thr	Arg	Leu	Asn		
	210					215					220						
Pro	Asp	Arg	Arg	Ile	Glu	Arg	Leu	Arg	Met	Phe	Asn	Lys	Arg	Leu	Lys		
225					230					235					240		
Ser	Cys	Lys	Gln	Ser	Val	Glu	Thr	Leu	Lys	Ser	Trp	Asn	Ile	Glu	Leu		
				245					250					255			
Asp	Ser	Ala	Leu	Val	Glu	Ile	Pro	Ala	Arg	Val	Leu	Pro	Pro	Glu	Lys		
		260						265					270				
Ile	Leu	Phe	Gly	Asn	Gln	Lys	Ile	Phe	Val	Cys	Asp	Ala	Arg	Ala	Asp		
	275						280					285					
Trp	Thr	Asn	Glu	Phe	Arg	Thr	Cys	Ser	Met	Phe	Lys	Asn	Val	His	Ile		
	290					295					300						
Asn	Arg	Trp	Tyr	Val	Ile	Thr	Pro	Ser	Arg	Asn	Leu	Arg	Glu	Thr	Gln		
305					310					315					320		
Glu	Phe	Val	Gln	Met	Cys	Ile	Arg	Thr	Ala	Ser	Ser	Met	Lys	Met	Asn		
				325					330					335			
Ile	Cys	Asn	Pro	Ile	Tyr	Glu	Glu	Ile	Pro	Asp	Asp	Arg	Asn	Gly	Thr		
			340					345					350				
Tyr	Ser	Gln	Ala	Ile	Asp	Asn	Ala	Ala	Ala	Asn	Asp	Pro	Gln	Ile	Val		
	355						360					365					
Met	Val	Val	Met	Arg	Ser	Pro	Asn	Glu	Glu	Lys	Tyr	Ser	Cys	Ile	Lys		
	370					375					380						
Lys	Arg	Thr	Cys	Val	Asp	Arg	Pro	Val	Pro	Ser	Gln	Val	Val	Thr	Leu		
385					390					395					400		
Lys	Val	Ile	Ala	Pro	Arg	Gln	Gln	Lys	Pro	Thr	Gly	Leu	Met	Ser	Ile		
				405					410					415			
Ala	Thr	Lys	Val	Val	Ile	Gln	Met	Asn	Ala	Lys	Leu	Met	Gly	Ala	Pro		
			420					425					430				
Trp	Gln	Val	Val	Ile	Pro	Leu	His	Gly	Leu	Met	Thr	Val	Gly	Phe	Asp		
	435						440					445					
Val	Cys	His	Ser	Pro	Lys	Asn	Lys	Asn	Lys	Ser	Tyr	Gly	Ala	Phe	Val		
	450					455					460						
Ala	Thr	Met	Asp	Gln	Lys	Glu	Ser	Phe	Arg	Tyr	Phe	Ser	Thr	Val	Asn		
465					470					475					480		
Glu	His	Ile	Lys	Gly	Gln	Glu	Leu	Ser	Glu	Gln	Met	Ser	Val	Asn	Met		
				485					490					495			
Ala	Cys	Ala	Leu	Arg	Ser	Tyr	Gln	Glu	Gln	His	Arg	Ser	Leu	Pro	Glu		
			500					505					510				
Arg	Ile	Leu	Phe	Phe	Arg	Asp	Gly	Val	Gly	Asp	Gly	Gln	Leu	Tyr	Gln		
	515						520					525					
Val	Val	Asn	Ser	Glu	Val	Asn	Thr	Leu	Lys	Asp	Arg	Leu	Asp	Glu	Ile		
	530					535					540						
Tyr	Lys	Ser	Ala	Gly	Lys	Gln	Glu	Gly	Cys	Arg	Met	Thr	Phe	Ile	Ile		
545					550					555					560		
Val	Ser	Lys	Arg	Ile	Asn	Ser	Arg	Tyr	Phe	Thr	Gly	His	Arg	Asn	Pro		
				565					570					575			
Val	Pro	Gly	Thr	Val	Val	Asp	Asp	Val	Ile	Thr	Leu	Pro	Glu	Arg	Tyr		
			580					585					590				
Asp	Phe	Phe	Leu	Val	Ser	Gln	Ala	Val	Arg	Ile	Gly	Thr	Val	Ser	Pro		
		595					600					605					
Thr	Ser	Tyr	Asn	Val	Ile	Ser	Asp	Asn	Met	Gly	Leu	Asn	Ala	Asp	Lys		
	610					615						620					
Leu	Gln	Met	Leu	Ser	Tyr	Lys	Met	Thr	His	Met	Tyr	Tyr	Asn	Tyr	Ser		
625					630					635					640		
Gly	Thr	Ile	Arg	Val	Pro	Ala	Val	Cys	His	Tyr	Ala	His	Lys	Leu	Ala		
				645					650					655			
Phe	Leu	Val	Ala	Glu	Ser	Ile	Asn	Arg	Ala	Pro	Ser	Ala	Gly	Leu	Gln		
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Asn Gln Leu Tyr Phe Leu  
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<213> Artificial Sequence

<220>  
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Xaa Xaa Xaa Tyr Xaa Xaa Xaa Xaa Xaa Xaa Gly Pro Xaa His Xaa Xaa  
20 25 30  
Xaa Phe Xaa Xaa Xaa Val Xaa Xaa Xaa Gly Xaa Xaa Xaa Xaa Xaa Gly  
35 40 45  
Xaa Gly Xaa Ser Lys Lys Xaa Xaa Ala Lys Xaa Xaa Ala Ala Xaa Xaa  
50 55 60  
Ala Leu Xaa Xaa Leu  
65

<210> 9  
<211> 766  
<212> PRT  
<213> Caenorhabditis elegans

<400> 9  
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20 25 30  
Val Pro Phe Glu Ala Val Gln Ala Met Asp Val Ile Leu Arg His Leu  
35 40 45  
Pro Ser Leu Lys Tyr Thr Pro Val Gly Arg Ser Phe Phe Ser Pro Pro  
50 55 60  
Val Pro Asn Ala Ser Gly Val Met Ala Gly Ser Cys Pro Pro Gln Ala  
65 70 75 80  
Ser Gly Ala Val Ala Gly Gly Ala His Ser Ala Gly Gln Tyr His Ala  
85 90 95  
Glu Ser Lys Leu Gly Gly Gly Arg Glu Val Trp Phe Gly Phe His Gln  
100 105 110  
Ser Val Arg Pro Ser Gln Trp Lys Met Met Leu Asn Ile Asp Val Ser  
115 120 125  
Ala Thr Ala Phe Tyr Arg Ser Met Pro Val Ile Glu Phe Ile Ala Glu  
130 135 140  
Val Leu Glu Leu Pro Val Gln Ala Leu Ala Glu Arg Arg Ala Leu Ser  
145 150 155 160  
Asp Ala Gln Arg Val Lys Phe Thr Lys Glu Ile Arg Gly Leu Lys Ile  
165 170 175  
Glu Ile Thr His Cys Gly Gln Met Arg Arg Lys Tyr Arg Val Cys Asn  
180 185 190  
Val Thr Arg Arg Pro Ala Gln Thr Gln Thr Phe Pro Leu Gln Leu Glu  
195 200 205  
Thr Gly Gln Thr Ile Glu Cys Thr Val Ala Lys Tyr Phe Tyr Asp Lys  
210 215 220

Tyr	Arg	Ile	Gln	Leu	Lys	Tyr	Pro	His	Leu	Pro	Cys	Leu	Gln	Val	Gly	225	230	235	240
Gln	Glu	Gln	Lys	His	Thr	Tyr	Leu	Pro	Pro	Glu	Val	Cys	Asn	Ile	Val	245	250	255	
Pro	Gly	Gln	Arg	Cys	Ile	Lys	Lys	Leu	Thr	Asp	Val	Gln	Thr	Ser	Thr	260	265	270	
Met	Ile	Lys	Ala	Thr	Ala	Arg	Ser	Ala	Pro	Glu	Arg	Glu	Arg	Glu	Ile	275	280	285	
Ser	Asn	Leu	Val	Arg	Lys	Ala	Glu	Phe	Ser	Ala	Asp	Pro	Phe	Ala	His	290	295	300	
Glu	Phe	Gly	Ile	Thr	Ile	Asn	Pro	Ala	Met	Thr	Glu	Val	Lys	Gly	Arg	305	310	315	320
Val	Leu	Ser	Ala	Pro	Lys	Leu	Leu	Tyr	Gly	Gly	Arg	Thr	Arg	Ala	Thr	325	330	335	
Ala	Leu	Pro	Asn	Gln	Gly	Val	Trp	Asp	Met	Arg	Gly	Lys	Gln	Phe	His	340	345	350	
Thr	Gly	Ile	Asp	Val	Arg	Val	Trp	Ala	Ile	Ala	Cys	Phe	Ala	Gln	Gln	355	360	365	
Gln	His	Val	Lys	Glu	Asn	Asp	Leu	Arg	Met	Phe	Thr	Asn	Gln	Leu	Gln	370	375	380	
Arg	Ile	Ser	Asn	Asp	Ala	Gly	Met	Pro	Ile	Val	Gly	Asn	Pro	Cys	Phe	385	390	395	400
Cys	Lys	Tyr	Ala	Val	Gly	Val	Glu	Gln	Val	Glu	Pro	Met	Phe	Lys	Tyr	405	410	415	
Leu	Lys	Gln	Asn	Tyr	Ser	Gly	Ile	Gln	Leu	Val	Val	Val	Val	Leu	Pro	420	425	430	
Gly	Lys	Thr	Pro	Val	Tyr	Ala	Glu	Val	Lys	Arg	Val	Gly	Asp	Thr	Val	435	440	445	
Leu	Gly	Ile	Ala	Thr	Gln	Cys	Val	Gln	Ala	Lys	Asn	Ala	Ile	Arg	Thr	450	455	460	
Thr	Pro	Gln	Thr	Leu	Ser	Asn	Leu	Cys	Leu	Lys	Met	Asn	Val	Lys	Leu	465	470	475	480
Gly	Gly	Val	Asn	Ser	Ile	Leu	Leu	Pro	Asn	Val	Arg	Pro	Arg	Ile	Phe	485	490	495	
Asn	Glu	Pro	Val	Ile	Phe	Phe	Gly	Cys	Asp	Ile	Thr	His	Pro	Pro	Ala	500	505	510	
Gly	Asp	Ser	Arg	Lys	Pro	Ser	Ile	Ala	Ala	Val	Val	Gly	Ser	Met	Asp	515	520	525	
Ala	His	Pro	Ser	Arg	Tyr	Ala	Ala	Thr	Val	Arg	Val	Gln	Gln	His	Arg	530	535	540	
Gln	Glu	Ile	Ile	Ser	Asp	Leu	Thr	Tyr	Met	Val	Arg	Glu	Leu	Leu	Val	545	550	555	560
Gln	Phe	Tyr	Arg	Asn	Thr	Arg	Phe	Lys	Pro	Ala	Arg	Ile	Val	Val	Tyr	565	570	575	
Arg	Asp	Gly	Val	Ser	Glu	Gly	Gln	Phe	Phe	Asn	Val	Leu	Gln	Tyr	Glu	580	585	590	
Leu	Arg	Ala	Ile	Arg	Glu	Ala	Cys	Met	Met	Leu	Glu	Arg	Gly	Tyr	Gln	595	600	605	
Pro	Gly	Ile	Thr	Phe	Ile	Ala	Val	Gln	Lys	Arg	His	His	Thr	Arg	Leu	610	615	620	
Phe	Ala	Val	Asp	Lys	Lys	Asp	Gln	Val	Gly	Lys	Ala	Tyr	Asn	Ile	Pro	625	630	635	640
Pro	Gly	Thr	Thr	Val	Asp	Val	Gly	Ile	Thr	His	Pro	Thr	Glu	Phe	Asp	645	650	655	
Phe	Tyr	Leu	Cys	Ser	His	Ala	Gly	Ile	Gln	Gly	Thr	Ser	Arg	Pro	Ser	660	665	670	
His	Tyr	His	Val	Leu	Trp	Asp	Asp	Asn	Asn	Leu	Thr	Ala	Asp	Glu	Leu	675	680	685	
Gln	Gln	Leu	Thr	Tyr	Gln	Met	Cys	His	Thr	Tyr	Val	Arg	Cys	Thr	Arg	690	695	700	

Ser Val Ser Ile Pro Ala Pro Ala Tyr Tyr Ala His Leu Val Ala Phe  
 705 710 715 720  
 Arg Ala Arg Tyr His Leu Val Asp Arg Glu His Asp Ser Gly Glu Gly  
 725 730 735  
 Ser Gln Pro Ser Gly Thr Ser Glu Asp Thr Thr Leu Ser Asn Met Ala  
 740 745 750  
 Arg Ala Val Gln Val Ile Leu Ala Phe Asn Leu Val Ser Ile  
 755 760 765

&lt;210&gt; 10

&lt;211&gt; 737

&lt;212&gt; PRT

&lt;213&gt; Oryctolagus cuniculus

&lt;400&gt; 10

Gly Lys Asp Arg Ile Phe Lys Val Ser Ile Lys Trp Val Ser Cys Val  
 1 5 10 15  
 Ser Leu Gln Ala Leu His Asp Ala Leu Ser Gly Arg Leu Pro Ser Val  
 20 25 30  
 Pro Phe Glu Thr Ile Gln Ala Leu Asp Val Val Met Arg His Leu Pro  
 35 40 45  
 Ser Met Arg Tyr Thr Pro Val Gly Arg Ser Phe Phe Thr Ala Ser Glu  
 50 55 60  
 Gly Cys Ser Asn Pro Leu Gly Gly Gly Arg Glu Val Trp Phe Gly Phe  
 65 70 75 80  
 His Gln Ser Val Arg Pro Ser Leu Trp Lys Met Met Leu Asn Ile Asp  
 85 90 95  
 Val Ser Ala Thr Ala Phe Tyr Lys Ala Gln Pro Val Ile Glu Phe Val  
 100 105 110  
 Cys Glu Val Leu Asp Phe Lys Ser Ile Glu Glu Gln Gln Lys Pro Leu  
 115 120 125  
 Thr Asp Ser Gln Arg Val Lys Phe Thr Lys Glu Ile Lys Gly Leu Lys  
 130 135 140  
 Val Glu Ile Thr His Cys Gly Gln Met Lys Arg Lys Tyr Arg Val Cys  
 145 150 155 160  
 Asn Val Thr Arg Arg Pro Ala Ser His Gln Thr Phe Pro Leu Gln Gln  
 165 170 175  
 Glu Ser Gly Gln Thr Val Glu Cys Thr Val Ala Gln Tyr Phe Lys Asp  
 180 185 190  
 Arg His Lys Leu Val Leu Arg Tyr Pro His Leu Pro Cys Leu Gln Val  
 195 200 205  
 Gly Gln Glu Gln Lys His Thr Tyr Leu Pro Leu Glu Val Cys Asn Ile  
 210 215 220  
 Val Ala Gly Gln Arg Cys Ile Lys Lys Leu Thr Asp Asn Gln Thr Ser  
 225 230 235 240  
 Thr Met Ile Arg Ala Thr Ala Arg Ser Ala Pro Asp Arg Gln Glu Glu  
 245 250 255  
 Ile Ser Lys Leu Met Arg Ser Ala Ser Phe Asn Thr Asp Pro Tyr Val  
 260 265 270  
 Arg Glu Phe Gly Ile Met Val Lys Asp Glu Met Thr Asp Val Thr Gly  
 275 280 285  
 Arg Val Leu Gln Pro Pro Ser Ile Leu Tyr Gly Gly Arg Asn Lys Ala  
 290 295 300  
 Ile Ala Thr Pro Val Gln Gly Val Trp Asp Met Arg Asn Lys Gln Phe  
 305 310 315 320  
 His Thr Gly Ile Glu Ile Lys Val Trp Ala Ile Ala Cys Phe Ala Pro  
 325 330 335  
 Gln Arg Gln Cys Thr Glu Val His Leu Lys Ser Phe Thr Glu Gln Leu  
 340 345 350  
 Arg Lys Ile Ser Arg Asp Ala Gly Met Pro Ile Gln Gly Gln Pro Cys  
 355 360 365



Phe Cys Lys Tyr Ala Gln Gly Ala Asp Ser Val Gly Pro Met Phe Arg  
 370 375 380  
 His Leu Lys Asn Thr Tyr Ala Gly Leu Gln Leu Val Val Val Ile Leu  
 385 390 395 400  
 Pro Gly Lys Thr Pro Val Tyr Ala Glu Val Lys Arg Val Gly Asp Thr  
 405 410 415  
 Val Leu Gly Met Ala Thr Gln Cys Val Gln Met Lys Asn Val Gln Arg  
 420 425 430  
 Thr Thr Pro Gln Thr Leu Ser Asn Leu Cys Leu Lys Ile Asn Val Lys  
 435 440 445  
 Leu Gly Gly Val Asn Asn Ile Leu Leu Pro Gln Gly Arg Pro Pro Val  
 450 455 460  
 Phe Gln Gln Pro Val Ile Phe Leu Gly Ala Asp Val Thr His Pro Pro  
 465 470 475 480  
 Ala Gly Asp Gly Lys Lys Pro Ser Ile Ala Ala Val Val Gly Ser Met  
 485 490 495  
 Asp Ala His Pro Asn Arg Tyr Cys Ala Thr Val Arg Val Gln Gln His  
 500 505 510  
 Arg Gln Glu Ile Ile Gln Asp Leu Ala Ala Met Val Arg Glu Leu Leu  
 515 520 525  
 Ile Gln Phe Tyr Lys Ser Thr Arg Phe Lys Pro Thr Arg Ile Ile Phe  
 530 535 540  
 Tyr Arg Asp Gly Val Ser Glu Gly Gln Phe Gln Gln Val Leu His His  
 545 550 555 560  
 Glu Leu Leu Ala Ile Arg Glu Ala Cys Ile Lys Leu Glu Lys Asp Tyr  
 565 570 575  
 Gln Pro Gly Ile Thr Phe Ile Val Val Gln Lys Arg His His Thr Arg  
 580 585 590  
 Leu Phe Cys Thr Asp Lys Asn Glu Arg Val Gly Lys Ser Gly Asn Ile  
 595 600 605  
 Pro Ala Gly Thr Thr Val Asp Thr Lys Ile Thr His Pro Thr Glu Phe  
 610 615 620  
 Asp Phe Tyr Leu Cys Ser His Ala Gly Ile Gln Gly Thr Ser Arg Pro  
 625 630 635 640  
 Ser His Tyr His Val Leu Trp Asp Asp Asn Arg Phe Ser Ser Asp Glu  
 645 650 655  
 Leu Gln Ile Leu Thr Tyr Gln Leu Cys His Thr Tyr Val Arg Cys Thr  
 660 665 670  
 Arg Ser Val Ser Ile Pro Ala Pro Ala Tyr Tyr Ala His Leu Val Ala  
 675 680 685  
 Phe Arg Ala Arg Tyr His Leu Val Asp Lys Glu His Asp Ser Ala Glu  
 690 695 700  
 Gly Ser His Thr Ser Gly Gln Ser Asn Gly Arg Asp His Gln Ala Leu  
 705 710 715 720  
 Ala Lys Ala Val Gln Val His Gln Asp Thr Leu Arg Thr Met Tyr Phe  
 725 730 735  
 Ala

<210> 11  
 <211> 66  
 <212> PRT  
 <213> *Xenopus laevis*

<400> 11  
 Pro Val Gly Ser Leu Gln Glu Leu Ala Val Gln Lys Gly Trp Arg Leu  
 1 5 10 15  
 Pro Glu Tyr Thr Val Ala Gln Glu Ser Gly Pro Pro His Lys Arg Glu  
 20 25 30  
 Phe Thr Ile Thr Cys Arg Val Glu Thr Phe Val Glu Thr Gly Ser Gly  
 35 40 45

Thr Ser Lys Gln Val Ala Lys Arg Val Ala Ala Glu Lys Leu Leu Thr  
           50                          55                          60  
 Lys Phe  
       65

<210> 12  
 <211> 66  
 <212> PRT  
 <213> Homo sapiens

<400> 12  
 Phe Met Glu Glu Leu Asn Thr Tyr Arg Gln Lys Gln Gly Val Val Leu  
   1                          5                          10                          15  
 Lys Tyr Gln Glu Leu Pro Asn Ser Gly Pro Pro His Asp Arg Arg Phe  
                           20                          25                          30  
 Thr Phe Gln Val Ile Ile Asp Gly Arg Glu Phe Pro Glu Gly Glu Gly  
                           35                          40                          45  
 Arg Ser Lys Lys Glu Ala Lys Asn Ala Ala Ala Lys Leu Ala Val Glu  
           50                          55                          60  
 Ile Leu  
       65

<210> 13  
 <211> 818  
 <212> PRT  
 <213> Caenorhabditis elegans

<400> 13  
 Val Asn Glu Glu Ile Lys Val Gln Phe Ala Lys Asn Phe Val Tyr Asp  
   1                          5                          10                          15  
 Asn Asn Ser Ile Leu Arg Val Pro Glu Ser Phe His Asp Pro Asn Arg  
                           20                          25                          30  
 Phe Glu Gln Ser Leu Glu Val Ala Pro Arg Ile Glu Ala Trp Phe Gly  
                           35                          40                          45  
 Ile Tyr Ile Gly Ile Lys Glu Leu Phe Asp Gly Glu Pro Val Leu Asn  
           50                          55                          60  
 Phe Ala Ile Val Asp Lys Leu Phe Tyr Asn Ala Pro Lys Met Ser Leu  
   65                          70                          75                          80  
 Leu Asp Tyr Leu Leu Ile Val Asp Pro Gln Ser Cys Asn Asp Asp  
                           85                          90                          95  
 Val Arg Lys Asp Leu Lys Thr Lys Leu Met Ala Gly Lys Met Thr Ile  
                           100                          105                          110  
 Arg Gln Ala Ala Arg Pro Arg Ile Arg Gln Leu Leu Glu Asn Leu Lys  
           115                          120                          125  
 Leu Lys Cys Ala Glu Val Trp Asp Asn Glu Met Ser Arg Leu Thr Glu  
   130                          135                          140  
 Arg His Leu Thr Phe Leu Asp Leu Cys Glu Glu Asn Ser Leu Val Tyr  
  145                          150                          155                          160  
 Lys Val Thr Gly Lys Ser Asp Arg Gly Arg Asn Ala Lys Lys Tyr Asp  
                           165                          170                          175  
 Thr Thr Leu Phe Lys Ile Tyr Glu Glu Asn Lys Lys Phe Ile Glu Phe  
                           180                          185                          190  
 Pro His Leu Pro Leu Val Lys Val Lys Ser Gly Ala Lys Glu Tyr Ala  
           195                          200                          205  
 Val Pro Met Glu His Leu Glu Val His Glu Lys Pro Gln Arg Tyr Lys  
   210                          215                          220  
 Asn Arg Ile Asp Leu Val Met Gln Asp Lys Phe Leu Lys Arg Ala Thr  
  225                          230                          235                          240  
 Arg Lys Pro His Asp Tyr Lys Glu Asn Thr Leu Lys Met Leu Lys Glu  
                           245                          250                          255

Leu Asp Phe Ser Ser Glu Glu Leu Asn Phe Val Glu Arg Phe Gly Leu  
 260 265 270  
 Cys Ser Lys Leu Gln Met Ile Glu Cys Pro Gly Lys Val Leu Lys Glu  
 275 280 285  
 Pro Met Leu Val Asn Ser Val Asn Glu Gln Ile Lys Met Thr Pro Val  
 290 295 300  
 Ile Arg Gly Phe Gln Glu Lys Gln Leu Asn Val Val Pro Glu Lys Glu  
 305 310 315 320  
 Leu Cys Cys Ala Val Phe Val Val Asn Glu Thr Ala Gly Asn Pro Cys  
 325 330 335  
 Leu Glu Glu Asn Asp Val Val Lys Phe Tyr Thr Glu Leu Ile Gly Gly  
 340 345 350  
 Cys Lys Phe Arg Gly Ile Arg Ile Gly Ala Asn Glu Asn Arg Gly Ala  
 355 360 365  
 Gln Ser Ile Met Tyr Asp Ala Thr Lys Asn Glu Tyr Ala Phe Tyr Lys  
 370 375 380  
 Asn Cys Thr Leu Asn Thr Gly Ile Gly Arg Phe Glu Ile Ala Ala Thr  
 385 390 395 400  
 Glu Ala Lys Asn Met Phe Glu Arg Leu Pro Asp Lys Glu Gln Lys Val  
 405 410 415  
 Leu Met Phe Ile Ile Ile Ser Lys Arg Gln Leu Asn Ala Tyr Gly Phe  
 420 425 430  
 Val Lys His Tyr Cys Asp His Thr Ile Gly Val Ala Asn Gln His Ile  
 435 440 445  
 Thr Ser Glu Thr Val Thr Lys Ala Leu Ala Ser Leu Arg His Glu Lys  
 450 455 460  
 Gly Ser Lys Arg Ile Phe Tyr Gln Ile Ala Leu Lys Ile Asn Ala Lys  
 465 470 475 480  
 Leu Gly Gly Ile Asn Gln Glu Leu Asp Trp Ser Glu Ile Ala Glu Ile  
 485 490 495  
 Ser Pro Glu Glu Lys Glu Arg Arg Lys Thr Met Pro Leu Thr Met Tyr  
 500 505 510  
 Val Gly Ile Asp Val Thr His Pro Thr Ser Tyr Ser Gly Ile Asp Tyr  
 515 520 525  
 Ser Ile Ala Ala Val Val Ala Ser Ile Asn Pro Gly Gly Thr Ile Tyr  
 530 535 540  
 Arg Asn Met Ile Val Thr Gln Glu Glu Cys Arg Pro Gly Glu Arg Ala  
 545 550 555 560  
 Val Ala His Gly Arg Glu Arg Thr Asp Ile Leu Glu Ala Lys Phe Val  
 565 570 575  
 Lys Leu Leu Arg Glu Phe Ala Glu Asn Asn Asp Asn Arg Ala Pro Ala  
 580 585 590  
 His Ile Val Val Tyr Arg Asp Gly Val Ser Asp Ser Glu Met Leu Arg  
 595 600 605  
 Val Ser His Asp Glu Leu Arg Ser Leu Lys Ser Glu Val Lys Gln Phe  
 610 615 620  
 Met Ser Glu Arg Asp Gly Glu Asp Pro Glu Pro Lys Tyr Thr Phe Ile  
 625 630 635 640  
 Val Ile Gln Lys Arg His Asn Thr Arg Leu Leu Arg Arg Met Glu Lys  
 645 650 655  
 Asp Lys Pro Val Val Asn Lys Asp Leu Thr Pro Ala Glu Thr Asp Val  
 660 665 670  
 Ala Val Ala Ala Val Lys Gln Trp Glu Glu Asp Met Lys Glu Ser Lys  
 675 680 685  
 Glu Thr Gly Ile Val Asn Pro Ser Ser Gly Thr Thr Val Asp Lys Leu  
 690 695 700  
 Ile Val Ser Lys Tyr Lys Phe Asp Phe Phe Leu Ala Ser His His Gly  
 705 710 715 720  
 Val Leu Gly Thr Ser Arg Pro Gly His Tyr Thr Val Met Tyr Asp Asp  
 725 730 735

Lys Gly Met Ser Gln Asp Glu Val Tyr Lys Met Thr Tyr Gly Leu Ala  
740 745 750  
Phe Leu Ser Ala Arg Cys Arg Lys Pro Ile Ser Leu Pro Val Pro Val  
755 760 765  
His Tyr Ala His Leu Ser Cys Glu Lys Ala Lys Glu Leu Tyr Arg Thr  
770 775 780  
Tyr Lys Glu His Tyr Ile Gly Asp Tyr Ala Gln Pro Arg Thr Arg His  
785 790 795 800  
Glu Met Glu His Phe Leu Gln Thr Asn Val Lys Tyr Pro Gly Met Ser  
805 810 815  
Phe Ala

<210> 14  
<211> 63  
<212> PRT  
<213> Caenorhabditis elegans

<400> 14  
Trp Val Gly Lys Leu Gln Phe Lys Ser Gln Lys Ser Lys Leu Gln Ala  
1 5 10 15  
Asp Ile Tyr Glu Asp Ser Lys Asn Glu Arg Thr Glu Phe Thr Leu Val  
20 25 30  
Ile Cys Thr Met Cys Asn Gln Lys Thr Arg Gly Ile Thr Ser Lys Gln  
35 40 45  
Lys Asp Ala Lys Asn Leu Ala Ala Trp Leu Met Trp Lys Ala Leu  
50 55 60